What is claimed is:

1. Method for operating a chemical and/or physical process in a vessel containing a liquid, a gas and/or solid particles, in which vessel a fluid is introduced through a hierarchical network of channels comprising parent and child generations of channel formations, wherein substantially each channel in a parent generation is divided into N channels of the child generation, whereby each of said child generations may in turn be a parent generation for a successive child generation, which network terminates in channel exits, such that said fluid is discharged from the channel exits substantially uniformly throughout the vessel volume.

2. Method according to claim 1 in which said network is a self-affine network of channels, wherein each of the channels in the parent generation have a diameter d_j and length l_j and each of the channels in the child generation have a diameter d_{j+1} and length l_{j+1}, wherein the ratios d_j/d_{j+1} and/or the ratios l_j/l_{j+1} are substantially constant for channels of successive generations running in parallel direction or in which method said network is a self-similar network which is a type of said self-affine network wherein the ratios d_j/d_{j+1} and l_j/l_{j+1} are substantially constant for channels of successive generations independent of their direction.

3. Method according to claim 2 wherein the ratios of diameters and/or lengths of channels in successive generations of said network are related to N by

$$N = (d_j/d_{j+1})^{\Delta}, \text{ and/or}$$

$$N = (l_j/l_{j+1})^{D},$$

wherein Δ and D represent an integer or a real positive number.

4. Method according to claim 3 wherein D is between 2 and 3.

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5. Method according to claim 1, in which said chemical and/or physical process is selected from a group consisting of a fluidized bed process, a slurry process, an absorption process, a gas/liquid bubble column process and an aeration process.

6. Method for scaling up chemical and/or physical processes which processes are carried out in a vessel comprising the steps of building a small scale vessel in which vessel a fluid is introduced through a hierarchical network of channels comprising parent and child generations of channel formations, wherein substantially each channel in a parent generation is divided into about N channels of the child generation, which network terminates in channel exits, such that said fluid is discharged from the channel exits substantially uniformly throughout the vessel volume and determining optimal geometry and optimal values for the parameters N, Δ and D, and subsequently building a large scale vessel in which said geometry and parameters are substantially the same as in the small scale vessel.

7. Vessel containing a hierarchical network of channels, said network comprising parent and child generations of channel formations, wherein substantially each channel in a parent generation is divided into N channels of the child generation, whereby each of said child generations may in turn be a parent generation for a successive child generation, which network terminates in channel exits, wherein said network is a self-affine network of channels, wherein each of the channels in the parent generation have a diameter d_j and length l_j and each of the channels in the child generation have a diameter d_{j+1} and length l_{j+1}, wherein the ratios d_j/d_{j+1} and/or the ratios l_j/l_{j+1} are substantially constant for channels of successive generations running in

parallel direction or in which vessel said network is a self-similar network which is a type of said self-affine network wherein the ratios d_j/d_{j+1} and l_j/l_{j+1} are substantially constant for channels of successive generations independent of their direction.

8. Vessel according to claim 7 wherein the ratios of diameters and/or lengths of channels in successive generations of said network are related to N by

$$N = (d_j/d_{j+1})^{\Delta}, \text{ and/or}$$

$$N = (l_j/l_{j+1})^{D},$$

wherein Δ and D represent an integer or a real positive number.

9. Vessel according to claim 8 wherein D is between 2 and 3.

10. Hierarchical network of channels comprising parent and child generations of channel formations, wherein substantially each channel in a parent generation is divided into N channels of the child generation, whereby each of said child generations may in turn be a parent generation for a successive child generation, which network terminates in channel exits, which said network is a self-affine network of channels, wherein each of the channels in the parent generation have a diameter d_j and length l_j and each of the channels in the child generation have a diameter d_{j+1} and length l_{j+1}, wherein the ratios d_j/d_{j+1} and/or the ratios l_j/l_{j+1} are substantially constant for channels of successive generations running in parallel direction or which network is a self-similar network which is a type of said self-affine network wherein the ratios d_j/d_{j+1} and l_j/l_{j+1} are substantially constant for channels of successive generations independent of their direction and wherein the ratios of diameters and/or

lengths of channels in successive generations of said network are related to N by

$$N = (d_j/d_{j+1})^{\Delta}, \text{ and/or}$$

$$N = (l_j/l_{j+1})^{D},$$

wherein Δ and D represent an integer or a real positive number.

11. Network according to claim 10 wherein D is between 2 and 3.

12. Network according to claim 10 wherein at least one material is present near the exits of said network and/or said material is present as a coating on at least part of the inner surface of said network, which material is capable of chemical and/or physical interactions with fluids.

13. Network according to claim 10 which is provided with means for obtaining a gradient in the dimensions of the respective exits.